

Docket Number: 1074-045  
Application No. 09/936,967  
Response B

**Listing of Claims:**

1. (previously presented) An integrated photoelastic modulator and diagnostic system comprising:
  - a photoelastic modulator including an optical element having a primary aperture through which primary light is directed; and
  - a diagnostic system including a diagnostic light source for directing through the optical element diagnostic light that is distinct from the primary light, wherein the diagnostic light source is configured so that the diagnostic light is directed through the optical element at a location remote from the primary aperture.
2. (cancelled)
3. (original) The system of claim 1 wherein the photoelastic modulator is operable to provide retardance characteristics in primary light that is directed through the optical element, and wherein the diagnostic system includes processing means for determining at least one retardance characteristic provided by the photoelastic modulator.
4. (original) The system of claim 3 including display means for displaying the retardance characteristic determined by the processing means.
5. (original) The system of claim 3 including feedback means for converting signals representing the determined retardance characteristic into control signals for the photoelastic modulator.
6. (previously presented) The system of claim 1 wherein the photoelastic modulator is operable to provide retardance characteristics in primary light that is directed through the optical element, and wherein the diagnostic system includes processing means for determining a retardance characteristic of the diagnostic light and using the retardance characteristic of the diagnostic light to calculate a retardance characteristic in the primary light that is provided by the photoelastic modulator.
7. (previously presented) A method of operating a photoelastic modulator that is operable for vibrating an optical element to impart retardance characteristics in a primary light beam that is directed through the optical element, comprising the steps of:
  - directing a diagnostic beam of light through the optical element;

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determining a retardance characteristic of the diagnostic beam of light that passes through the optical element;  
generating a diagnostic signal representative of that retardance characteristic; and  
converting the diagnostic signal to a verification signal that is representative of a retardance characteristic of the primary light beam.

8. (cancelled)

9. (original) The method of claim 7 including the step of converting the diagnostic signal into a control signal for controlling the photoelastic modulator.

10. (previously presented) The method of claim 7 including the step of transmitting the primary light beam and the diagnostic beam of light through the optical element so that the beams do not cross each other.

11. (previously presented) The method of claim 10 wherein the directing step includes the step of directing the diagnostic beam of light through a portion of the optical element that is spaced an offset distance from another portion of the optical element, through which other portion the primary light beam is directed such that the retardance characteristic of the diagnostic beam of light is different from the imparted retardance characteristic in a primary light beam.

12. (previously presented) The method of claim 11 including the step of considering the offset distance and the diagnostic signal for determining a verification signal that is representative of a retardance characteristic of the primary light beam.

13. (previously presented) The method of claim 10 including the step of housing the optical element in a manner that defines two discrete apertures through which the primary and diagnostic light beams may be directed so that the primary beam is transmitted through one aperture and the diagnostic beam is transmitted through the other aperture.

14. (previously presented) A diagnostic system for a photoelastic modulator that is operable for vibrating an optical element to impart retardance characteristics in primary light that is transmitted through the optical element at a first location in the optical element, comprising:  
a source of diagnostic light arranged to transmit diagnostic light through the optical element at a second location that is spaced from the first location so that the optical element imparts

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retardance characteristics that are different from the retardance characteristics imparted in the primary light beam; and

a detector arranged for detecting at least a portion of the diagnostic light transmitted through the second location of optical element.

15. (previously presented) The system of claim 14 including mounting means for mounting the diagnostic system in a manner that permits simultaneous transmission of the diagnostic light and the primary light through the optical element in a manner such that the diagnostic and primary light travel along substantially parallel paths in the optical element.

16. (previously presented) The system of claim 14 further comprising a housing for opaquely enclosing the optical element but for two discrete, transparent openings.

17. (original) The system of claim 14 wherein the light source includes a collimating lens and polarizer.

18. (original) The system of claim 14 wherein the detector includes a waveplate and an analyzer.

19. (original) The system of claim 1 wherein the diagnostic light source provides diagnostic light that has a wavelength other than the wavelength of the primary light.

20. (previously presented) The method of claim 7 wherein the directing step includes the step of selecting a wavelength of the diagnostic beam to be different from the wavelength of the primary beam.

21. (previously presented) An integrated photoelastic modulator and diagnostic system comprising:

a photoelastic modulator including an optical element having a primary aperture through which primary light beam is directed;

a diagnostic system including a diagnostic light source for directing through the optical element a diagnostic light beam that is distinct from the primary light beam;

a detector for detecting diagnostic light that is directed through the optical element; and

processing means for extrapolating from the detected diagnostic light a retardance characteristic imparted by the photoelastic modulator to the primary light.

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22. (previously presented) The system of claim 21 including means for directing the primary and diagnostic light beams through the optical element so that the center of the beams are spaced apart a distance "D" from each other.

23. (previously presented) The system of claim 22 wherein the processing means uses the distance "D" in extrapolating the retardance characteristic imparted by the photoelastic modulator to the primary light.

24. (previously presented) The system of claim 21 wherein the diagnostic system includes means for directing the diagnostic light and the primary light through the optical element at different times.

25. (previously presented) The system of claim 21 further comprising feedback means for converting signals representing the extrapolated retardance characteristic into a control signal for the photoelastic modulator.